

REMARKS/ARGUMENTS

Applicant thanks Examiner for the detailed Office Action dated June 12, 2007. In response to the issues raised, the Applicant offers the following submissions and amendments.

Amendments

Independent claims 1, 18 and 35 have been amended to define that the heater is energized with an electrical pulse having a duration less than 2 microseconds. The pulse duration times are discussed in detail at page 3, line 19 and page 9, line 17.

Accordingly, the amendments do not add new matter.

35 U.S.C. §102 - Claims

Claims 1 to 3, 5, 6, 8, 18 to 20, 22, 23, 25, 35 to 39 and 41 stand rejected for lack of novelty in light of US 6,003,977 to Weber et al.

The printhead of the present invention combats cavitation corrosion by spacing the collapse point from the heater element and also by reducing the size of the bubble generated. Collapsing the bubble in the ink can produce ink break down from 'sonoluminescence' as discussed in the detailed description at page 24, lines 18 to 20. Keeping the bubble small reduces or avoids any destruction of the ink components.

Weber does not teach any electrical drive pulse durations or bubble nucleation times which are roughly equivalent. However, from col. 5, lines 31-35, the heater is 144 square microns and embedded into the substrate. It is energized at 4nJ per square micron and so the drive pulse has an energy of 576 nJ. The drive pulses used by the present invention are well below 500 nJ. The higher energy is symptomatic of the embedded heater design which also slows the rise in heater temperature because of conduction to the solid substrate. A slower temperature rise means longer bubble nucleation times and hence longer drive pulses.

The present invention provides a printhead that generates a gas bubble with a drive pulse duration less than 2 microseconds. Accordingly, the cited reference does not teach fundamental elements of amended claims 1, 18 and 35. It therefore also fails to anticipate any of claims 1 to 3, 5, 6, 8, 18 to 20, 22, 23, 25, 35 to 39 and 41.

35U.S.C§103 - Claims

Claims 7, 11, 14, 15, 17, 24, 28, 31, 32, 34, 40, 44, 47, 48 and 50 stand rejected as obvious in light of Weber in view of US 5,706,041 to Kubby.

As discussed above, Weber fails to teach all the elements of amended claims 1, 18 and 35. Kubby also fails to disclose a gas bubble generated by a drive pulse with a duration less than 2 microseconds. Accordingly, the cited references do not teach or suggest all claim elements and so fail to support a §103 rejection.

35USC§101 – Claims

The claims stand rejected for statutory double patenting in view of the claims of US 6,669,334. Independent claims 1, 18 and 35 have been amended to define that the drive pulse has a duration less than 2 microseconds. This additional limitation ensures that all the present claims have respective scopes that are not co-extensive with any of the '108 claims.

Conclusion

It is respectfully submitted that the Examiner's rejections have been successfully traversed and the application is now in condition for allowance. Accordingly, favorable reconsideration is courteously solicited.

Very respectfully,

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